Quadratic Functions

Vertex form

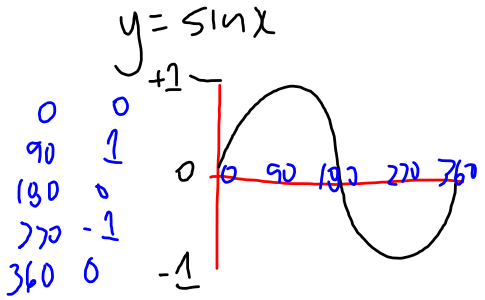
$f(x) = a(x-h)^2 + k$

a = direction / stretch / compress

h = left or right
horizontal translation

k = up or down
vertical translation

Cycles - Sinusoidal Functions



Apr 22-9:00 AM

p359 6.5 Transformations

$f(x) = a \sin x$

$f(x) = \sin(x-c)$

$f(x) = \sin(x) + d$

$$f(x) = a \sin(x-c) + d$$

d = change → axis of symmetry up/ down

c = change left/right

a = stretch/compress and/or reflect (amplitude)

May 4-1:31 PM

Given $f(x) = \sin(x - c) + d$

c = phase shift
measured in degrees
- horizontal translation left or right
- if $c > 0$, shift right
  $c < 0$, shift left

d= vertical translation up or down
$d > 0$ shift up
$d < 0$ shift down

May 4-2:04 PM

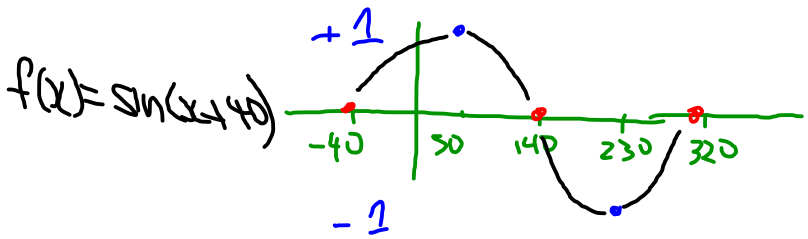
Example $f(x) = a\sin(x-c)+d$

1a) $f(x) = \sin(x + 40^\circ)$ $c = -40$

0 − 40	−40 0
90 − 40	50 1
180 − 40	140 0
270 − 40	230 −1
360 − 40	320 0

−40	0
50	1
140	0
230	−1
320	0

phase shift left 40°

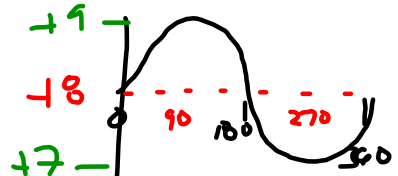


Nov 25-9:53 AM

$f(x) = a\sin(x-c)+d$

$f(x) = \sin x + 8$

Vertical translation up 8



$D \{x \in R \mid 0 \le x \le 360\}$

$R \{f(x) \in R \mid 7 \le f(x) \le 9\}$

0	8
90	8+1=9
180	8
270	8-1=7
360	8

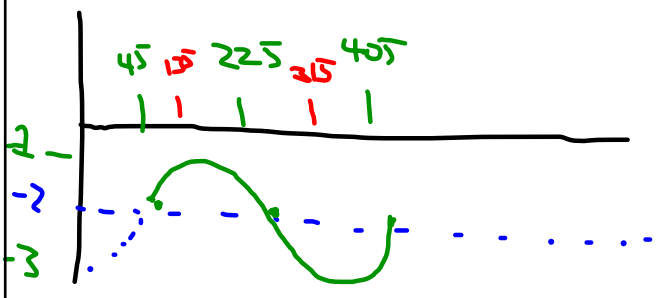
May 4-2:08 PM

$f(x) = a\sin(x-c)+d$

$f(x) = \sin(x-45^\circ)-2$

shift right 45°

shift down 2



45	-2
135	-1
225	-2
315	-3
405	-2

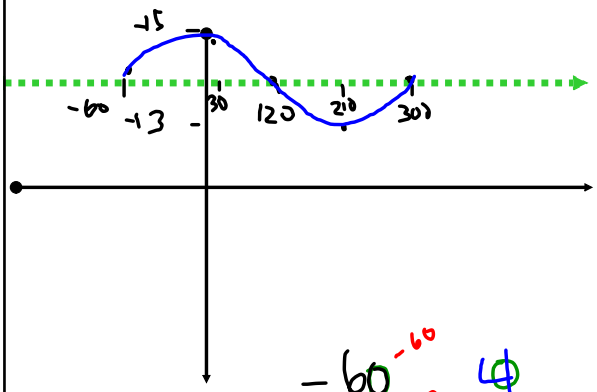
$D = \{x \in R\}$

$R = \{f(x) \in R \mid -3 \le f(x) \le -1\}$

May 4-2:11 PM

Graph

$f(x) = \sin(x+60) + 4$



0	0
90	1
180	0
270	-1
360	0

-60	4
30	5
120	4
210	3
300	4

Apr 22-10:16 AM

d) $f(x) = -2\sin(x+30)+5$

phase shift left 30°

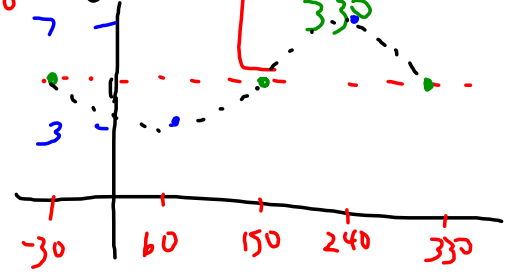
shifted up 5

-ve reflected

amplitude = 2 stretched by 2

0	0
90	+1
180	0
270	-1
360	0

-30	5
60	3
150	5
240	7
330	5



Nov 25-10:12 AM

$f(x) = a \sin(x-c) + d$

right 20°

up 5

$f(x) = \sin(x-20) + 5$

$D = \{x \in R\}$

$R = \{f(x) \in R \mid 4 \leq f(x) \leq 6\}$

Nov 25-10:19 AM

Example 3

$f(x) = a \sin(x-c) + d$

$f(x) = a \sin(x+90) + d$

$f(x) = \sin(x+90) + 1$

Nov 25-10:22 AM

Example 4

$f(x) = a \sin(x-c) + d$

$f(x) = -\sin(x-c) + d$ reflected

$f(x) = -\sin(x) + 4$ up 4 units

Example 5

$f(x) = a \sin(x-c) + d$

$f(x) = a \sin(x-c) - 1$ down 1 unit

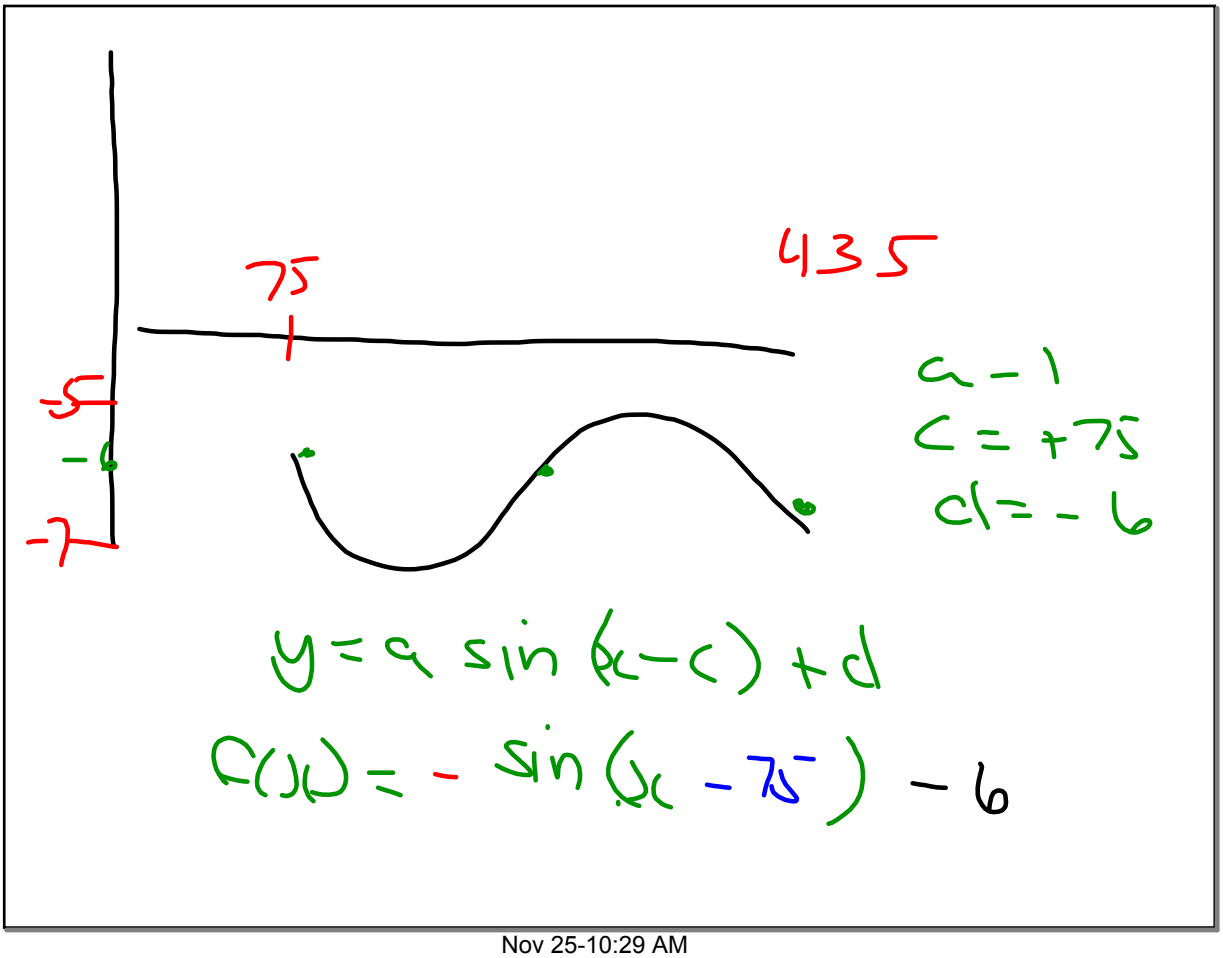
$f(x) = 2 \sin(x) - 1$ stretched by 2

Nov 25-10:25 AM

p 365-367

q 4-6, 10 & 15

May 4-2:18 PM



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